REMARKS

First of all, it is believed that the following description of Fan et al. will help to clarify the differences between the teaching of this reference and the present invention. Figs. A to D below are drawings similar to those in the present invention, but illustrating the procedure of Fan et al.

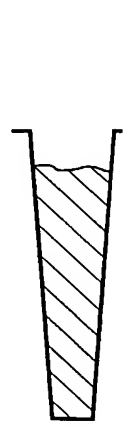


Fig. A

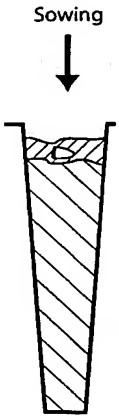


Fig. B

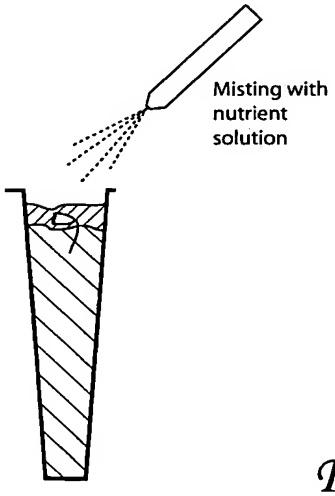


Fig. C

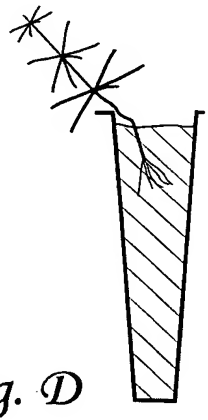
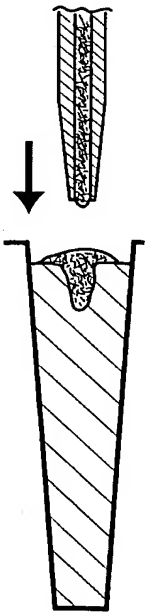


Fig. D

As in the present invention, Fig. A shows a container holding soil or a soil substitute as a growth medium for the embryo and seedling. Fig. B shows the planting of a pre-germinated somatic embryo on or in the soil. It will be noticed from this drawing that, in contrast with the present invention, the embryo is not generally provided with any source of nutrient at this stage. There may be a thin covering of the growth medium (as shown), which does not provide any support to keep the embryos in a vertical orientation if they are not

already vertical when the covering is applied (indeed, the application of the covering may cause some embryos to tilt over). Consequently, a number of embryos fail to orient themselves in the ideal vertical growth position. The embryo of Fig. B is shown in this condition. Fig. C shows that, after planting, water and nutrient are supplied to the developing embryo, preferably in the form of a nutrient solution supplied as a mist or atomized droplets from a spray device. This is continued at least until the embryo becomes autotrophic and converts to a seedling. As shown in Fig. D, the seedling grows and develops like any other plant, except that a number do not grow vertically (like the one shown) and hence have to be discarded.

The process of Fan et al., while capable of successfully converting embryos to acceptable seedlings, has a certain failure rate. This is due not only to the lack of vertical orientation as discussed above, but also because the nutrients essential for continued germination and growth of the embryo have to be supplied intermittently from an external source (e.g. a spray device), and this may not be done on a regular basis for some of the embryos (e.g. due to missed schedules or an inaccessible location in the greenhouse or the like). Moreover, the nutrients, being applied in the form of a solution, do not remain in contact with the embryo for very long and may drain away or evaporate before full utilization of the nutrients by the plant.



The present invention, at least in preferred forms, addresses these problems. As shown in Fig. 2 of the present application (duplicated here without reference numerals), the surface of the growth medium is provided with a droplet of a flowable semi-solid medium to form a pool that contains both nutrients for the plant and solid particles. The nutrient is thus available to the embryo from the start of planting, and remains in contact with the embryo because it does not drain away rapidly. The medium provides physical support for the plant both immediately (because of the semi-solid nature of the medium (see Fig. 3 of the present application) and over the long term because of the solid content of the medium that remain in place even when the non-solid components have dissipated. This leads to a greater number of healthy plants.

Fig. 2

Despite the comments made by the Examiner, Fan et al. lacks the use of such a medium at this stage (immediately before or during sowing). It also seems that the Examiner may be confusing the flowable medium added as shown here, the nutrient solution of Fan et al. (used in Fig. C above), and the growing or rooting substrate (soil or soil equivalent), which Fan et al. describes as a three-phase substrate (solid, liquid and gas), but only because all growth media must contain such components if healthy growth is to take place.

A new claim (claim 45) has been added to the specification to distinguish even more clearly from Fan et al. However, it is believed that the original claims define a patentable advance over Fan et al. and the other references relied on by the Examiner for the following reasons.

Claim Rejections – 35 USC § 102

The Examiner rejected claim 1 and numerous other claims as being clearly anticipated by Fan et al. It is to be noted that claim 1 contains the following limitation (among others):

> dispensing a quantity of the nutrient medium onto a surface of a porous solid growth substrate for the somatic plant embryo or germinant and contacting said plant embryo or germinant with said nutrient medium;

This is the step represented in Fig. 2 above.

The Examiner first commented on Applicant's prior argument that Fan et al. teaches a process in which somatic embryos are pre-germinated and desiccated, and then the dried germinants are sown directly into soil. The pre-germination step is carried out in-vitro and the sowing step is carried out ex-vitro. However, the Examiner pointed out that Fan et al. disclose that the pre-germination step may be carried out in-vitro or ex-vitro. Nevertheless, Fan et al. clearly show the pre-germination and sowing steps to be separate, and prefers to carry out the pre-germination step in sterile in-vitro conditions (Column 5, lines 45 to 47). The point is that Fan et al. clearly distinguish between the pre-germination step and the subsequent sowing step as separate steps. The present invention does not relate to a pre-germination step, but rather to the growth of embryos or germinants into autotrophic seedlings. This was the point Applicant was trying to make in the previous response.

The Examiner then stated that Fan et al. teaches the use of a nutrient medium containing a flowable component (the liquid media) and a solid component (coconut husk fibers – Col. 9, lines 1-55). However, the "nutrient medium" described in this passage of Fan et al. is, in fact, the growing substrate or rooting substrate (shown in Fig. A above) and it may not necessarily contain any nutrient compounds. Moreover, the medium of Fan et al. is not "dispensed" onto a surface of a porous solid. The embryos may be covered with a thin layer of additional rooting substrate that may be the same material as that below or a different type of material (e.g. coconut husk fibers) (Column 9, line 64 to Column 10, line 5). Again, such covering material may not contain any nutrient and is provided just as a covering. This is not the same as the nutrient medium required by claim 1 of the present application.

The Examiner did not find Applicant's previous comments persuasive that Fan et al. does not provide any support for the sown embryo, referring to Column 8, lines 60-67 and Column 9, lines 1-2 of Fan et al. However, the sections identified by the Examiner relate to the pre-germination of the embryos and not to the sowing of the embryos following pre-germination for the purpose of converting the embryos into autotrophic seedlings. In Fan et al., following the pre-germination step, the pre-germinated embryos are subsequently dried before sowing in soil or the like. Thus, this section of Fan et al. is not relevant to the process of claim 1, which relates to the sowing of the embryos for growth into seedlings. The Examiner stated that this difference is not relevant. However, claim 1 requires the embryos to be exposed to environmental conditions effective for growth into autotrophic seedlings. Fan et al. does not do this in the section relied on by the Examiner. The medium and conditions are only effective for pre-germination of the embryos. These are distinctly different steps, as acknowledged by Fan et al. in the definitions found in Column 7, lines 9 to 18. Fan et al. clearly does not contemplate using any of the methods or materials intended for pre-germination for the growth of seedlings, i.e. full germination and growth. A skilled artisan would not consider the pre-germination procedure as relevant to the procedure used for sowing and growth of embryos. It is well known that different conditions and materials are required for the various stages of plant cloning and no assumption can be made that a medium effective for one stage (e.g. pre-germination) would be effective for another stage (e.g. conversion to seedlings).

The Examiner contradicted Applicant's comments in the prior response regarding the teaching of Fan et al. of applying a 1-9% sucrose solution. It was pointed out that this relates

to the pre-germination step. However, the Examiner has now said that this is not persuasive because Fan et al. teaches the application of a 3% sucrose solution to the surface of the growing substrate. However, as represented in Fig. C above, this takes place after the embryo has been sown in the growth medium. Fan et al. suggests at Col. 10, line 56 and 57, "applying a 3% sucrose solution as a mist to the surface of the growing substrate containing a sown pre-germinated embryo" (emphasis added). This does not take place on sowing itself. Moreover, the nutrient is applied dissolved in a solution that can be misted, which is clearly different from the nutrient medium of the present application which could not be misted since it contains a solid and a preferably a semi-solid.

The Examiner commented that Applicant's statements regarding obviousness over Fan et al. were inappropriate because an obviousness objection had not been made, but Applicant was merely trying to provide comments that would be appropriate if the Examiner found the remarks on anticipation to be persuasive, only to issue a new objection based on obviousness. It is noted, however, that the Examiner does not intend to make such an objection, so further comments on these lines will not be presented.

Claim Rejections – 35 USC § 103

The Examiner maintained the rejection of claims 15, 17, 19 and 32 as unpatentable over Fan et al. in view of Pierik.

Concerning the comments in the response to the previous official action, the Examiner pointed to Column 8, line 52 of Fan et al. to show that the gelling agent could have been added to the liquid germination medium. However, it is again pointed out that this part of Fan et al. relates to a pre-germination step and not a step of sowing embryos in a growth medium for conversion to seedlings and growth into plants. Fan et al. makes a clear distinction between these steps and does not suggest the use of a gelling agent for the sowing step (conversion to seedlings).

The Examiner also pointed to a statement in the application on pages 26 and 27 regarding the penetration of growth medium by a gelled liquid. However, an important point of the present invention is that the nutrient medium is applied to the porous growth medium before or at the same time as sowing an embryo, and the nutrient medium is maintained in contact with the embryo. As represented by Figs. B and C above, Fan et al. supplies nutrient

medium after sowing has taken place, and preferably after the embryo has been covered by a layer of growth medium. In such conditions, a gelled medium would likely sit on top of the covering layer of growth medium without much or any penetration. A skilled artisan would therefore not think of using a gelled medium in the procedure of Fan et al. In the present application, it is explained that additional nutrient medium may also be applied after the embryo has initially been sown, but this is not when the gelled medium would be used. The gelled medium is used at the time of sowing, a conventional nutrient solution would be used later and applied in conventional ways. Indeed, it is the application of such solutions that eventually washes away or dissolves the flowable component of the nutrient solution dispensed at the time of sowing, and that is why the latter contains a solid component, i.e. to provide physical support when the flowable component is no longer present.

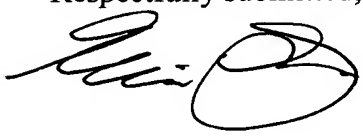
The Examiner then disputed the statements made previously by Applicant regarding the failure to provide an environment of high humidity if using a nutrient medium containing a gelling agent. The Examiner suggests that a skilled person would modify Fan et al. by adding agar knowing that such gelling agent serves as a binding agent for nutrient and water, reducing the need for high humidity conditions. However, since Fan et al. stress the use of high humidity conditions for several days after sowing (Column 10, lines 13 to 17), such modification would be directly contrary to the teaching of Fan et al. The high humidity is "to facilitate somatic embryo imbibition and germination" (Column 10, line 17). The success of a gelled medium would in such circumstances be unpredictable, and would require experimentation and testing. The skilled person could not be sure of success. Furthermore, the gelled medium would be applied after sowing rather than before or during sowing, so the result would not provide a process equivalent to that of the present invention.

The Examiner maintained the rejection of claims 21, 22, 25, 26 and 28 as being unpatentable over Fan et al. in view of each of Gupta (US 5,563,061) and Tremblay et al. (Plant Cell). The Examiner rejected the argument that Gupta and Tremblay et al. relate to the treatment of immature cells, not mature embryos capable of germination. The Examiner pointed out that Gupta teaches the use of maltose at stage IV (mature embryos). While Applicant does not agree with the Examiner's position, it is again pointed out that the rejected claims all depend, directly or indirectly, from claim 1 and it is believed for the reasons given above that claim 1 is neither anticipated by nor obvious over any of the references cited by

the Examiner. The rejected claims should therefore be considered allowable for this reason alone.

Favourable reconsideration of this application is requested.

Respectfully submitted,



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